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APPENDIX VIII

COLLECTION OF SUBJECT HEADING LISTS, CLASSIFICATION SYSTEMS AND OTHER INFORMATION

[redacted] STATINTL

Summary.

Approximately six weeks were devoted to personal visits to a number of establishments. A brief account is given of each of these visits and lists are provided (see Appendix B) of material which was either collected for immediate use or noted as being of eventual interest.

Visits to the Patent Office and to the Welch Medical Library of Johns Hopkins University provided an opportunity to become acquainted with their use of IBM equipment in studying problems of classification and indexing.

Organizations Visited

September 26 - October 11, 1951

U. S. Patent Office - (B. E. Lanham, Classification Examiner, and George Leibowitz, Patent Examiner). Most of the time during this two-week period was spent at the Patent Office, thoroughly studying the mechanized indexing research project there. Background on the problems peculiar to patent examining was provided by the following: "History of Classification of Patents" by M. F. Bailey and "The Classification of Patents (2nd Revision)", a publication of the Patent Office, and two papers presented by the group before meetings of the Division of Chemical Literature of the ACS, namely, "The Use of the U. S. Patent Office Classification in Chemical Searches" and "Mechanized Searching in the U. S. Patent Office". Many long and fruitful conferences were conducted by Mr. Lanham. A complete report of this study of the Patent Office system is attached as Appendix A.

U. S. Dept. of Agriculture Library - (Ralph R. Shaw, Librarian). A morning was spent at the library discussing the Rapid Selector with Dr. Shaw. The advantages of the machine were enumerated - speed of searching and instantaneous reproduction of desired material, for example. Dr. Shaw said he codes his material randomly, that is, he assigns consecutive numbers to bibliographic entries arranged alphabetically. These numbers are then entered on the code half of the film, adjacent to the micro reproduction of the material. Searching for combinations of concepts necessitates multiple searches, one for each concept desired. There does not seem to be much study underway on coding possibilities, but research is being done on improving the machine itself - speeding up the photocopying process, simplifying the input program, etc. Dr. Shaw showed us the Selector, and ran a test pattern for us.

National Bureau of Standards - (W. A. Wildhack, Physicist). The group studying basic instrumentation for scientific research briefly outlined the program they are undertaking to classify and index the subject matter of their specialized field. Doctor Keinath is compiling a dictionary of instrumentation under their direction. Our discussion was short and incomplete. Mr. Stern, information director, is interested in the development of new machines for searching the literature, and Dr. Wildhack is interested in our terminology studies. It would be advantageous to plan another visit with these people in the near future.

National Institutes of Health - (Scott Adams, Librarian). At luncheon with a group of methods-research people and the librarian of NIH, classification problems and philosophies were discussed. The project of the Research Planning Council which attempted to identify the content of research in various laboratories and classify it by methods of research was outlined. Personnel of the Council felt that discussion with [redacted] about classification and organization might help this project in its work. STATINTL

Navy Library - (Mrs. Ruth Hooker, Coordinator of Navy Libraries). The filing system of the Navy's libraries is peculiarly adapted to the libraries' problems and their use by Navy personnel. As Mrs. Hooker explained, they are "short on science and technology" but strong in such subjects as military tactics and naval history. Mrs. Hooker suggested that we write to the Secretary of the Navy requesting a copy of the Navy Filing Manual, which has the standard subject headings for administration, Navy history, military science, logistics, etc., as used in the Department's installations.

Research and Development Board - (Cedric Flagg, Technical Information Office.) The personnel at RDB were most helpful in answering queries concerning subject heading lists and classification schemes. Mr. Flagg and Mrs. Helen Brownson made available a large supply of such material, which was examined

and noted for our acquisition. (See Appendix B). The RDB has an IBM system which operates with confidential material. Mr. Lowry, librarian at the Army Library, was also visited in the Pentagon. He expressed great interest in our program of research.

Library of Congress, Navy Research Section - (Robert Bray, Assistant Director). Mr. Bray and Mrs. Janet Snyder provided a large collection of material, most of which had already been located elsewhere. A few valuable new references showed up. (See Appendix B). The make-up and processing of TIP, Technical Information Pilot, publication of the Section, was described and shown in detail. Also, the services of the Section in answering requests for information about Navy research projects was discussed. Mr. Bray is continuing to send pertinent references to us. He suggests our bibliography of subject heading lists, glossaries, etc., be printed in SLA Washington Chapter Notes, for possible additions by members of the Chapter.

National Paint, Varnish and Lacquer Association - (Robert Ware, Librarian). This is an interesting example of a trade association library, small and highly specialized but very active. Mr. Ware made available copies of the subject heading list he has compiled for the industry and its information facilities.

Chemical-Biological Coordination Center, National Research Council - (Walter R. Kirner, Director.) The chemical and biological codes developed by this Center for use on punched cards in correlating data were explained and illustrated in a series of informal discussions with Dr. Harriet Geer, chemist, and Mrs. Anne Williams, biologist. The CBCC was started in 1946, and serves as a clearing agency for correlating data on the biological action of chemicals on biological systems. Data is gathered from three sources: new chemicals sent out by the Center to testing agencies, unpublished data sent to the Center by cooperating agencies, and data published in journals. No searching is done except in answer to questions sent in to the Center.

The chemical code, published by the National Research Council as "A Method of Coding Chemicals for Correlation and Classification" was based on the work of Frear and Seiferle. The biology code, entirely new, has been developed through five editions, and the final form, which seems most satisfactory, has not been published yet.

The Center assigns a serial number to the chemicals as received. This number is entered on the card in which the chemical code for the compound is punched, and on the card on

which the codes for biological action are recorded. Since the serial number is also entered on the original data sheets in the master file, all material dealing with a compound is quickly found.

The Center operates its system expertly and efficiently with IBM standard tabulating equipment. Mr. Ballard, who manages the machine operations and card files, demonstrated the particular manner in which he handles his cards. At the present time, the chemical structures of about 30,000 compounds are recorded on IBM cards. Mr. Ballard pre-files the cards under each of the chemical group codes used to describe the complete structure. Since there are on the average five groups per compound, the chemical file now contains approximately 150,000 cards. The biological code file, much newer and therefore much smaller at the moment, is also pre-filed according to sections such as action, organism, tissue, organ, etc. Pre-filing insures that a smaller number of cards need to be handled in answering any question. As a matter of fact, some questions can be answered by eye-scanning a small set of cards in one of the pre-filed sections, or by comparison of one such batch against another, without recourse to machine selection at all. Pre-filing also enables multiple-facet questions to be answered in spite of the limitations of the standard tabulating equipment which is used. For example, a structure with groups A and B can be found by sorting for Group B on all cards pre-filed under group A.

Organizations Visited

October 17 - October 19, 1951

Engineering Societies Library - (Ralph Phelps, Librarian). This well-equipped library serves members of the societies and visitors. The card index file is large and arranged by subject categories. There is also an alphabetical index and an author index to material held by the library. The subject headings of the classified index might prove helpful to us as a supplement of other subject heading lists.

H. W. Wilson Company - (Charles J. Shaw, Editorial Staff). The Wilson Company, publisher of various guides and indexes to periodical literature, maintains its own printing establishment in conjunction with its editorial offices. Their subject headings, maintained in active files rather than as printed lists, were for the most part too general and non-technical for our interest. The visit to their building was interesting for general information about their activities.

Engineering Index - (George Poock, Staff Member). This was another visit of little immediate profit but of general interest. Mr. Poock was intrigued by the scope of our research project and impressed with its possibilities. He reviewed the references to subject heading lists, classification schemes, and glossaries of terms which we had collected. His opinion was that we had gathered all the important material, but promised to send on to us any further references which he might find.

N. Y. Public Library - (Thomas Thomson, Science-Technology Division). The card files of the Science-Technology Division yielded a few more references for our subject headings and classification schemes lists, (See Appendix B), and our bibliography of glossaries of terms and scientific dictionaries was immeasurably helped when Mr. Thomson showed his personal card file of glossaries. This collection, which occupies two standard file drawers, has complete references to works published up to about fifteen years ago, and incomplete notes about more recent acquisitions. Imcomplete in this connection means that such data as the name of the publisher or a summary table of contents might be lacking from the card. The collection includes scientific and technical books which have glossaries of terms included in their contents, as well as complete dictionaries. Mr. Thomson permitted copying of pertinent references from the file (See Appendix C), and promised continued help at any time we wish to call upon him.

Calco Chemical Division, American Cyanamid Co. - (Miss Betty J. Cole, Librarian). This industrial library is very well organized and maintained by Miss cole and her staff. They use standard card files and alphabetical indexing which proves satisfactory for them. However, Miss Cole said many scientists maintain individual punched-card files at their desks. As for subject heading lists, Miss Cole felt we had obtained all the important references. She provided a copy of "A List of Subject Headings for Chemistry Libraries" for our collection, and later sent excerpts from her own subject heading list, sections which she had expanded and modified for the library's special needs. This will be of interest to us as we work with various sections of our own subject heading list.

Organizations Visited

October 22 - November 14, 1951

Welch Medical Library - (Dr. Sanford V. Larkey, Librarian). At Welch Medical Library attention was devoted almost exclusively to their subject heading list which was being compiled for the "Current List of Medical Literature", published at the Army Medical Library. The terminal report of the project, dated January 31, 1951, describes the scope of the research in medical literature to be undertaken, as well as the background and need for such research. But at the time of my visit, the subject heading list to be used from January 1952 on was being readied. This provided an opportunity to work along with Dr. Larkey, Miss Field, and Mr. Garfield on this phase of the work. It was extremely interesting and should be of use to us in our study of subject headings.

The six-point program of the group at Welch can be outlined as follows:

1. Collection and organization of headings from various sources into card files.

2. Study and analysis of headings as they are used in printed indexes.

3. Investigation of scope and interrelationship of headings as shown in classified arrangements and in categories.

4. Tests of their validity and appropriateness in actual indexing.

5. Amalgamation of headings from various sources into a tentative basic standard list.

6. Development of canons and procedures for the maintenance of such a list.

(The sources and the indexes mentioned included those of the Army Medical Library as well as of Welch.)

The subject heading list had been compiled and sent to AML for evaluation and corrections (Step #4), which were then incorporated into the list. This entailed alterations of and additions to the file of standard IBM cards from which the printed index is made. Use being made of various card operations - punching,

verifying, interpreting, reproducing, and sorting of cards - was studied.

The project is now using standard IBM tabulating equipment, but intends to switch soon to the #101 Statistical Machine. The latter affords greater possibilities in sorting and selecting cards.

The subject heading list contains main headings, see references, see also references, and also X and XX references, which provide tracers back from the see and see also references. The layout of the cards is as follows:

> Main headings start on column 1 with no other punching on the card.
>
> S references start on column 1, have a double space before and after the "s", the number "1" punched in column 51, and the subject referred to repeated from column 58 on.
>
> SA references start on column 3, have a single space before the subject referred to, "2" punched in column 51, and the subject referred from starting in column 58.
>
> X cards start on column 5, have a double space before the subject referred from, "4" in column 51, and the subject referred to starting in column 58.
>
> XX cards start on column 5, have a single space before the subject referred from, "5" punched in column 51, and the subject referred to starting in column 58.

The XX cards were reproduced automatically from the SA cards by "cross-over" of the material from the right-hand side of the SA card to the left-hand side of the XX card and vice versa. At the same time the reproducing machine punches the letters "XX" in columns 5 and 6. But the X cards had to be reproduced manually, because the machine could not be set to stop after each word before the letter s, since the words were of varying lengths.

The file is kept in seven alphabets, main headings, see references, etc., all of which can be interfiled mechanically in order to get a completely alphabetized file from which a printed list can be made. This file will be kept up to date with any corrections or changes originating at the Army Medical Library.

Future plans for the project at Welch Medical Library include study of the terms on this list by categories, for further development of principles and procedures. This category study will then lead to development of a code for punched cards, for searching of literature references. The empirical manner in which the project is being carried out is noteworthy. It would be most interesting to return to Welch for further study of their work.

Organizations Visited

November 15 - November 16, 1951

Special Libraries Association, Headquarters. A morning was spent at the offices of SLA, studying the file of subject heading lists and classification schemes which is maintained for the use of members on a loan arrangement. The references are submitted to the central file by members who have needed, for their specialized files, unique terms or arrangements of terms and who have drawn up such lists to fill their wants. Several new references were added to our list (Appendix B), which we can borrow as we need them.

Columbia University School of Library Service - (Miss Darthula Wilcox, Librarian). The trip to Columbia yielded many good references to background and methodology material for the field of subject heading and classification work. Miss Wilcox made available a thesis entitled "An Analysis and Evaluation of Subject Heading Lists Used in Special Libraries in the New York City Area." It had been submitted by Doris Balef toward her master's degree in June 1951. Her many references to textbooks and journal articles about subject headings (See Appendix B) will prove of great value to us. The thesis was well written and very interesting in its conclusions and recommendations concerning subject heading lists.

Appendix A

The Patent Office classification system was designed to facilitate searches in the prior art to determine patentability of new applications. In general, patents were classified as to use or function of the object or composition of matter described. Due to the overwhelming number of patents issued and the bewildering variety of disclosures in them, searching has become a most difficult and time-consuming task. After the patent examiner has evaluated the new application and decided just what kind of prior art should be reviewed, he must spend many hours searching through what he considers the most likely place in the existing classification scheme where pertinent material may be found. Besides the possibility of a pertinent patent being placed in an unusual "pigeonhole" due to some unusual claims, the examiner must contend with strictly human errors due to the tiresome routine nature of the searching job.

The possibility of eliminating much of this routine work was studied in a mechanized search project at the Patent Office. It was recognized that mechanical methods could not, and should not be expected to, eliminate all the work necessary in the examination of patents. However, it was hoped to appreciably cut down the time required for searching patents in order to locate the pertinent ones. This time was estimated as 60% of a patent examiner's working day.

The existing classification scheme encompassing 300-odd classes and over 4000 sub-classes, though unwieldy, has proved an effective searching aid. Originally, the classification was done by someone not versed in the art, and glaring errors were made. Lack of clear logic and cognizance of the ultimate purpose of the system made it difficult for subsequent users. Over a period of time all but 12 of the classes in the system have been redone, at least in some detail. If sub-classes became too large, they were broken up into several smaller subclasses. The practise has been to break up a subclass containing more than 100 patents. If a whole class proved unsuitable, it was completely redone. Modern classes are arranged so that in moving down the classification system one proceeds from product to process for making to apparatus used in making. Within these orders of superiority subclasses are set up in decreasing order of the complexity of subject matter embraced.

It was decided to alter this system for mechanized searching, rather than work out a completely new one. For example, there was

no adequate method in the old system for finding compositions of matter per se, apart from their functions or use. The new system records individual ingredients and employs a punched-card machine to correlate and to combine these in searching for compositions. (Compositions of matter are defined as physical mixtures of two or more ingredients generally adapted to a particular use.) Also, the conventional classification requires that some one aspect of an idea be selected as a basis for classification of the idea. As the classes dealing with chemical compounds in the Patent Office system progressed from most complex to most simple compounds, and any compound went into the first level to which it could be assigned, the conventional classification provided no direct means for conducting generic searches. For example, amino phenols were unambiguously placed under amines, but how could one find all possible phenols? The mechanized system offers the possibility of using the multiple viewpoint, in which substances are designated to as many characteristics as required. Then machine searching is directed to any one or several characteristics.

Generic searching is of great significance in patent examining. An examiner must search for disclosures analogous to or of the same genus as the subject matter of the specific claim under consideration. The new system is built up of schedules, that is, of ordered lists of concepts or categories. These schedules, with their terms arranged in decreasing order of complexity of subject matter, are designed to show generic-specific relationships. Numerical codes are assigned to the categories in logical sequence, so that assignment of a code to a subject automatically makes available all terms generic to that subject, and at the same time indicates its relationship to other categories in the schedule. A section of the schedule dealing with organic chemical structures illustrates this point.

Heterocyclic Compounds	1313		
Azoles	1313	2512	
*Thiazoles	1313	2512	1423
Hetero Sulfur	1313	3412	
Five-Membered Ring	1313	3412	1423

*(Thiazoles are included under azoles, and not hetero-sulfur compounds, in accordance with the "degree-of-complexity" rule.)

The codes 1313 2512 1423 and 1313 3412 1423 show the terms generic to the specific subjects, and also the relation of one to

the other. The schedule also makes possible the inclusion of new subjects in proper relationship to the rest of the category.

The Patent Office mechanized search project decided to use the IBM #101 Statistical Machine, rather than standard tabulating equipment. The latter imposed the restriction of fixed fields on a card, which limits the amount of material which can be coded per card. The system of unit cards was studied, wherein one card contains only one item of information. It was decided, due to the nature of patents, that such a system would involve an enormous number of cards and excessive handling of them. The project made unusual use of the coding possibilities opened up by the 101 machine in that codes were punched horizontally rather than vertically on the cards. Then as many encoded subjects as desired were punched over as many cards as needed, yielding great freedom with relatively few cards and little handling. All cards pertaining to a single disclosure (unit of information) in a certain patent were tied together with the patent number. A "last card" signal in column 11 on the card told the machine that all cards of that series had been scanned. Separate disclosures within a patent were treated as separate units, but all such disclosures were tied to the one patent by the patent serial number. Therefore, the separation was in a sense mechanical rather than actual.

The Patent Office group selected eight sub-classes from Class 167, dealing with medicinal compositions of matter, to use in conducting experiments on mechanized searching. For these subclasses a schedule was drawn up, arranging the subject material as (a) inorganic chemical compounds, (b) organic chemical compounds, (c) a complex schedule covering botanical, zoological, mineral and supplementary identifications, and (d) functions. To these categories or definitions were attached numerical codes, showing inherently the generic-specific relationships of the schedules. A unit code is a single code referring to a category in the schedule. An item code then is either a single unit code or the group of unit codes which adequately index a subject from multiple viewpoints. For example, the item code for chloroform always involves the unit code for its composition, trichloromethane, and may, in addition, require the unit code for its function as a solvent in a composition.

The eight sub-classes contained a total of 441 patents which the machine searched in 4½ minutes. There were 1843 cards with 6,272 items (units of information) encoded under 18,650 unit codes. The average speed of search was ninety-five patents per minute. The average number of cards per patent was 4.2, and the average number of items (units of information) per patent was 14.

The types of questions which can be answered by this system were thoroughly analyzed and tested. Such questions are characterized below.

I. Unit code A when no code less than the code indicated but all codes indented thereunder are desired. (From genus to species but not from species to genus).

II. A/B/C - These units may be anywhere, but all 3 must be found if the patent is to be accepted.

III. A or B or C - These units also may be anywhere, but the presence of any one is satisfactory.

IV. (A/B/C) or (D/E/F) - Type II plus Type III simultaneously asked.

V. (A/B/C) or (A/B/D) - Like Type IV but with duplication in the alternatives.

VI. A/B/C, where each unit is in different item groupings. A signal punch in column 12 was devised for distinguishing items one from another. Then within an item any one of the codes may be selected provided the other ingredients are found in other items.

VII. (ABC) combined in the same item. This is the inverse of VI, and restricts the scope of inquiry to greater specificity. A searcher can synthesize an enormous number of generic and subgeneric terms by combining unit codes in this way.

VIII. A/B, as separate codes, when they are present as items AB and B. The machine searches for A and B separately. If it finds A in the item code AB, then it searches for B and can answer the question. But if the codes were punched into the card as BA, the machine recognizes the B and starts searching for unit code A. When it cannot be found, the fact that the conditions were fulfilled would not be detected. Several tentative methods of solving this problem were suggested, such as a sequential arrangement of the codes to predetermine their order in a series, or special wiring and machine handling.

IX. (ABC) / (DEF) - An extension of Type VII.

X. (ABC) / (ABD) - An extension of Type IX, where it is merely necessary for the machine to recognize the same code more than once.

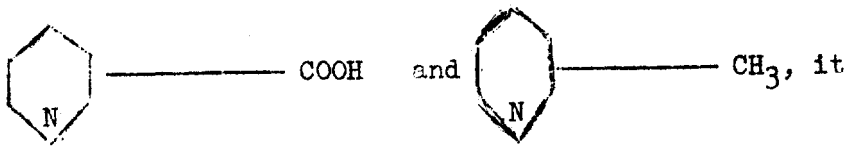
XI. (ABC) or (DEF) - Similar to Type III.

XII. (ABC) or (ABD) - Also similar to Type III.

XIII. (AB no C), when an item multiply-defined is wanted provided it does not contain the unit code C. Generic searches select ABX but here a search can exclude certain undesirable members of the genus. This allows more versatility in synthesizing generic terminology.

A problem unique to patent examining, and of great importance, is the problem of alternatives. Patent disclosures often state that one of several compounds may be added to another of several, in making a composition to serve a specific use. That is, A, either 1 or 2, may be added to B, either 3 or 4 yielding mixtures 1/3, 1/4, 2/3, and 2/4. In machine searching of such unit codes care must be taken to avoid false combinations, viz. 1/2, 3/4, 1/2/3, 1/2/4. The problem is not difficult when close alternatives carry the same code for either one would be selected but not a combination of both. The problem lies more in the realm of coding rather than of searching.

The so-called "Markush Problem" is particularly troublesome in searching. Markush claims are directed to some class of compounds for which no standard chemical term exists. In such cases, the patent disclosures cannot group all possibilities under a single heading. Typically, the Markush claim involves the following wording, "X where X is selected from the group consisting of ----". For example, if a patent claims as alternatives the two compounds



it cannot be classified with patents dealing with all pyridines, for that group is beyond the scope of the patent. Such a patent has reference value for all the alternatives covered, but it is impractical and sometimes impossible to code each alternative. A tentative solution is to add a special signal punch for sub-groupings under an item representing a Markush formula. From each sub-group containing codes for one of the variables a single code would be selected. For example, when a formula R - X is disclosed, wherein R is either A, B, or C, and X is either D or E, the signal arrangement would be as follows:

ITEM SIGNAL	ADDITIVE SIGNAL		ALTERNATIVE SIGNAL	
		R		A
				B
				C
		X		D
				E

Item signal punched at the group of codes for a single compound.

Additive signal at the end of each group of alternatives.

Alternative signal punched next to each variable.

Only one of the alternative signal codes would be selected from each additive signal code. That is, A/D or A/E would be selected but not A/B or A/C. Only broadest codes should be used, so the machine can make combinations.

This type of card could not be used with the ordinary search cards. Usually the most specific code possible is used, but not with Markush formulae. Any combinations within such formulae meeting the request for a single compound would not be selected, due to the difference in coding. Perhaps two different cards decks will be needed, one for general cases and one for Markush situations. Then a complete search would call for examination of both decks. Further attention must be directed to this problem.

The success of mechanical searching of patents was analyzed from two different points of view. First the effectiveness of machine searching versus manual searching was compared. All of the patents found by skilled examiners were found by the machine, plus certain others. For those selected a very detailed study of pertinency was made, from the second point of view, that is a comparison of actual performance versus theoretical performance. Of the pertinent patents selected, 99.6% had subject matter satisfying the request in the disclosures and/or the claims. The rest (0.4%) had such subject matter in prior art references. Non-pertinent patents were selected because of various errors. 37.2% of these were accounted for by inaccuracies in analysis of subject matter, 26.3% were due to misjudgment in defining the scope of the search, 20.6% due to defects in the schedules and the accompanying coding system, and the rest, in decimal %'s, were errors of a clerical nature. So it is seen that, aside from

these clerical errors, the fault lies with the abstractor or the schedule. The abstractor's errors were due to failure to show two distinct disclosures, or due to the trouble already discussed with alternate disclosures. Schedule errors were due to ambiguous or inadequate sections of the present form of schedule. This type of mistake, most frequently encountered, can be remedied by revision and definition of the schedule.

The mechanized indexing project just discussed used patents dealing with compositions of matter for its subject material. Future research must be done with patents dealing with processes and apparatus. It is thought by the team that the broad relationships involved in such patents can be provided for by modification of the methods employed already. Further study must also be given to the problem of abstracting patents prior to coding. It is a process of skilled interpretation rather than merely listing words. Some of the questions to be answered are: Should inherent properties be encoded? A guiding principle with respect to significant inherent but undisclosed properties is needed. Can the various reactants and intermediates employed in a process be recorded as compositions of matter? Can mixtures of ingredients with each of all possible solvents be described? And, of course, the complex puzzle of how best to handle alternatives, including Markush formulae, needs concentration and intensive research for its solution.

Appendix B

Subject Heading Lists and Classification Schemes

Government Sources

*List of Subject Headings, 2nd edition, The Library of Congress, Navy Research Section, Washington - August, 1950.

*Standard Aeronautical Indexing System, Institute of Aeronautical Sciences for Central Air Documents Office, August, 1949.

Army Medical Library Classification, 1st edition, Washington - 1951

*Standard Commodity Classification, Washington - 1943-1944, supplement to vol. 2 (1945) - revised vol. I (Dec. 1946).

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Subject Heading List for Navy Research Libraries, 3rd edition, Navy Department, Washington - April, 1946.

*Subject Headings for the Index of NACA Publications, National Advisory Committee on Aeronautics, Washington - August, 1949.

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Subject Headings Used in the Dictionary Catalogs of the Library, 5th edition, Library of Congress, Subject Cataloging Division 1948.

Preliminary List of ATI Subject Headings, Central Air Documents Office - Sept., 1949.

*Subject Headings Used in the Catalogs of U. S. Atomic Energy Commission, Technical Information Service, Oak Ridge - July, 1951.

Research Projects Classification Index - Office of Experiment Stations, U. S. Dept. of Agriculture.

Uniform Project System - Administrative Regulations, Amendment #1, U. S. Dept. of Agriculture (June, 1950).

Non-Government Sources

Subject Headings for the Information File, compiled by M. O. Ball, H. W. Wilson Co., N. Y. - 1951.

Subject Headings, Quarterly Cumulative Index Medicus, 2nd edition American Medical Association - 1949.

Uniform System of Medical Classification - Defense Research Board, Dept. Nat'l. Health and Welfare, and Armed Forces Medical Services - Canada (1950).

*Metallurgical Literature Classification, by American Society of Metals and Special Libraries Association - 1950.

*A List of Subject Headings for Chemistry Libraries, Special Libraries Association - 1945.

*Subject Headings in Physics, M. J. Voigt, American Library Association - 1944.

A System of Classification for a Pharmaceutical Library, E. J. Heath, Massachusetts College of Pharmacy - 1926.

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Tentative System of Subject Headings for Literature of Military Science, Fremont Rider, Cumulative Digest Corp., N. Y. - 1922.

War Subject Headings for Information Files, 2nd edition, Special Libraries Associations - 1943.

Short List of Subject Headings, compiled by Heather Sherrie and Phyllis Mander Jones, Sydney, Angus and Robertson - 1950.

Subject Heading List in Cumulative Index to "Meteorological Abstract" publ. by American Meteorological Society, Boston.

Classified Schemes and Subject Headings List, Loan collection of Special Libraries Association - November 1951.

From this collection:

Ordnance Research and Development Subject Heading List, Mildred E. Kirkpatrick, Aberdeen Proving Ground - 1947.

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Air University Library List of Subject Headings, Air University, Maxwell Air Force Base, Alabama - Sept., 1950.

Aviation Subject Headings, Agnes Gautreaux and Mary Lally - 1949

Additions & Revisions for Subject Headings in Recent Aeronautical Literature, Willard Kelso Dennis - 1946.

Classification Scheme of the Bibliography of Agriculture, U. S. Department of Agriculture Library - 1946.

Subject Heading List (Air Conditioning), Carrier Corp., Syra. N. Y., 1944.

Classification Scheme for Welding, Air Reduction Co., Inc., 1945.

Outline of Classification for Technical Files, Aluminum Laboratories, Ltd., 1948.

Decimal System for Classification of Chemical Research Documents, Calcott and Maurer, American Chemical Society - 1948.

Foundry Literature - Punched-Card Code, American Foundrymen's Association - 1948.

AIA Standard Filing System, American Institute of Architects, Washington - 1948.

Classification Scheme, Department of Chemistry Library, Harvard, 1946.

Classification Scheme Used for Organic Chemistry, U. S. Rubber Co.

Library Classification System, Combustion Engineering Corp.

Classification Used in Research Library, Eastman Kodak Co, Research Library.

An Electrical Engineering Classification and Index, George Parson

Subject Headings, International Harvester Co., Technical Library Advanced Engineering Department.

Suggested Scheme for Classifying Military Units of U. S. Army, Michael S. Koch - 1948.

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Science Classification, Eli Lilly and Co. Library.

List of Subject Headings, No. Carolina State College of Agriculture & Engineering, School of Textiles Library - 1949.

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